

Fluoride-Free Nb Cavity EP

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Maximum smoothness

Robust process

Reasonable cost

Environmental friendliness

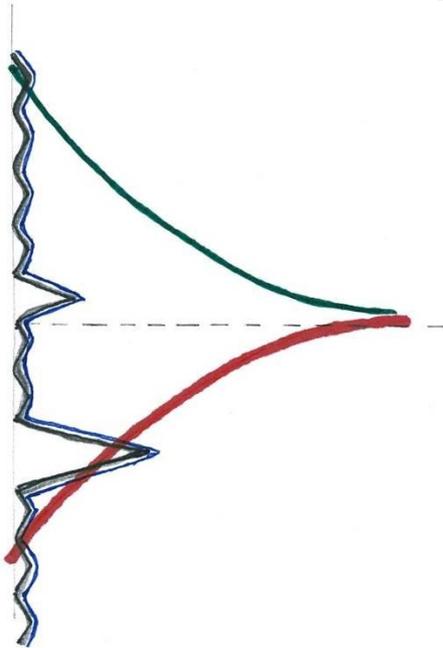
Sometime soon

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EP According to Landolt

Attack largest asperities most

Mass transfer resistance leads to etchant depletion, product accumulation



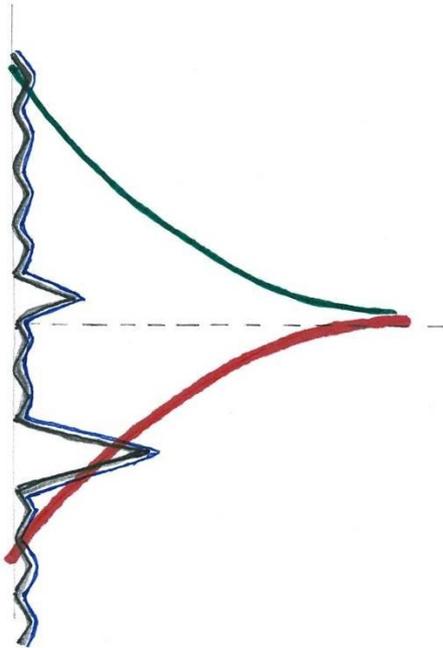
Eliminate selective site attack

Surface film renders all sites equivalent

EP According to Landolt

Explored T_i and T_a

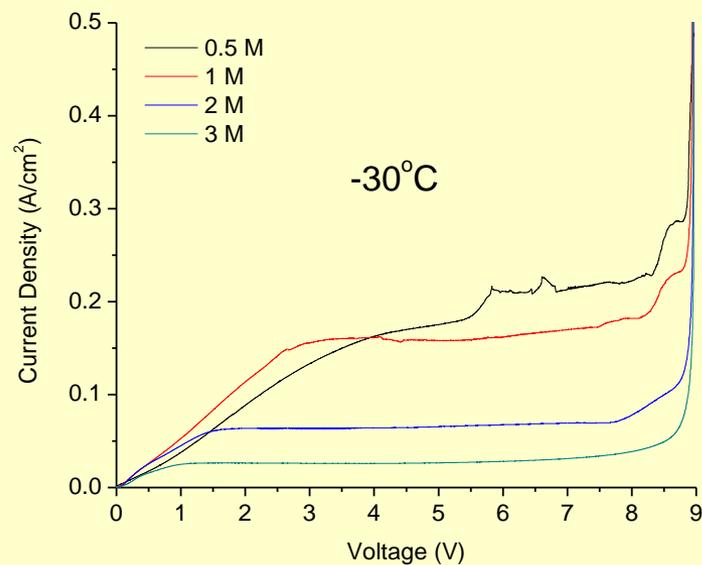
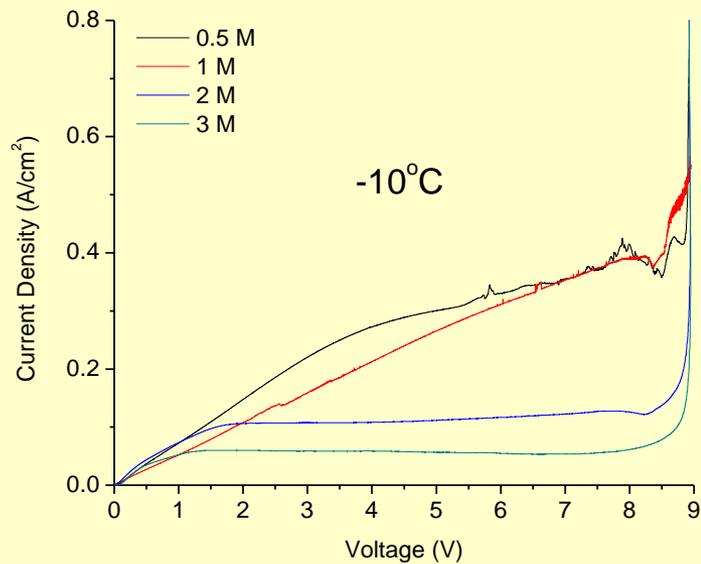
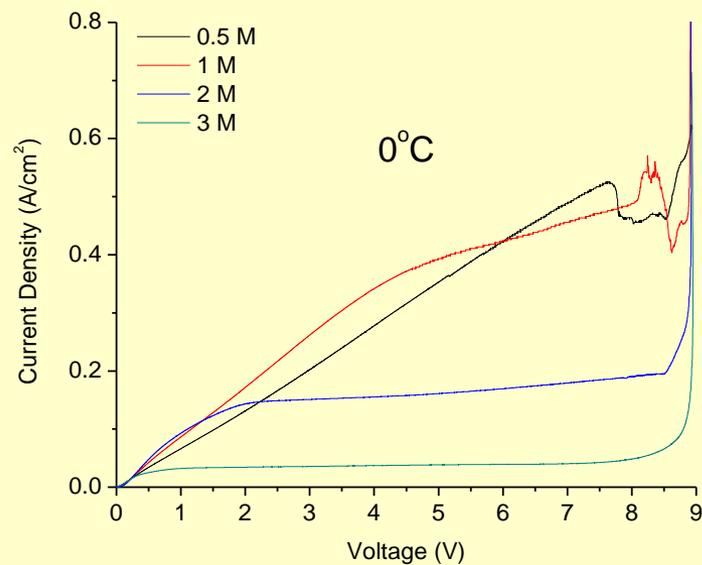
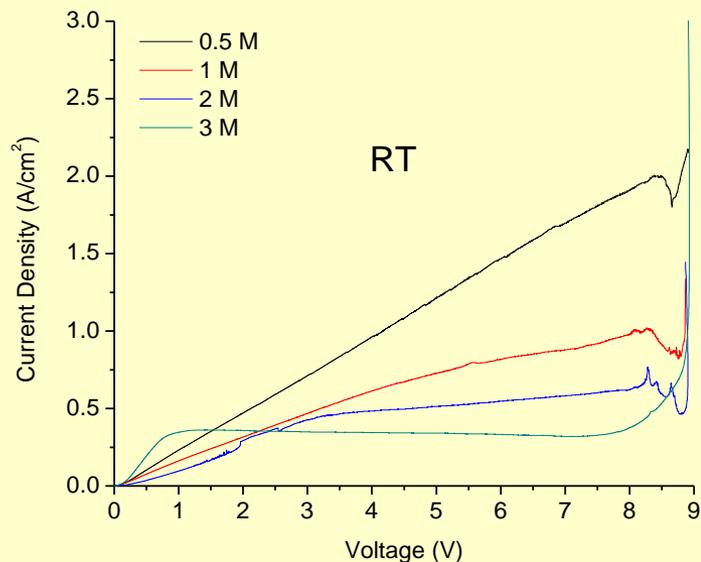
0.5 M – 5 M sulfuric acid in methanol
RT to -10°C
Cell, RDE, EIS experiments



Experimental Results

Current plateau: lo T, 3 M acid
Product inhibition mechanism
Salt film on surface

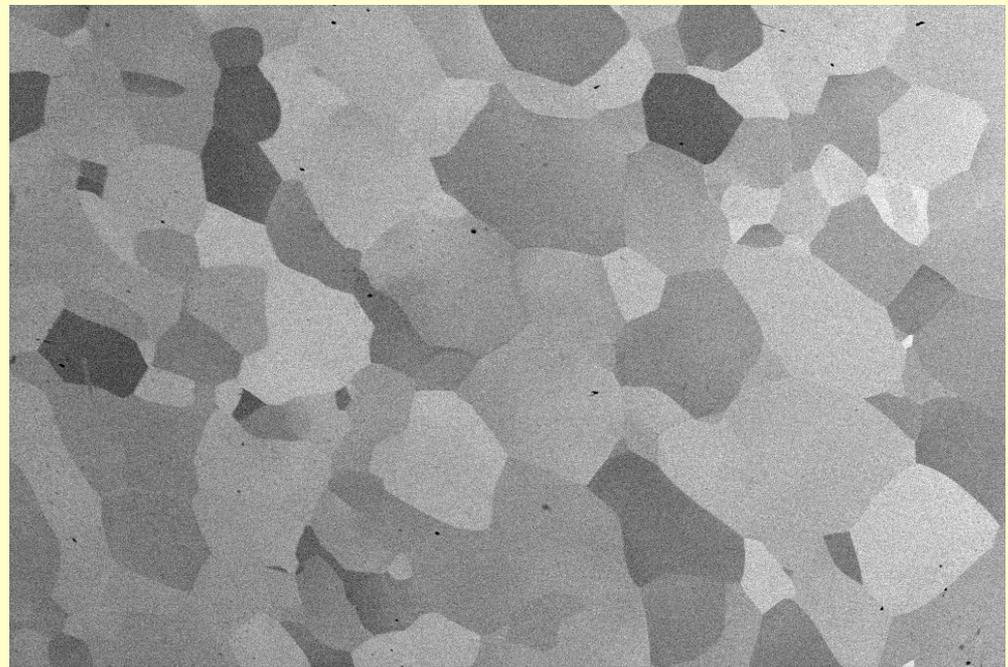
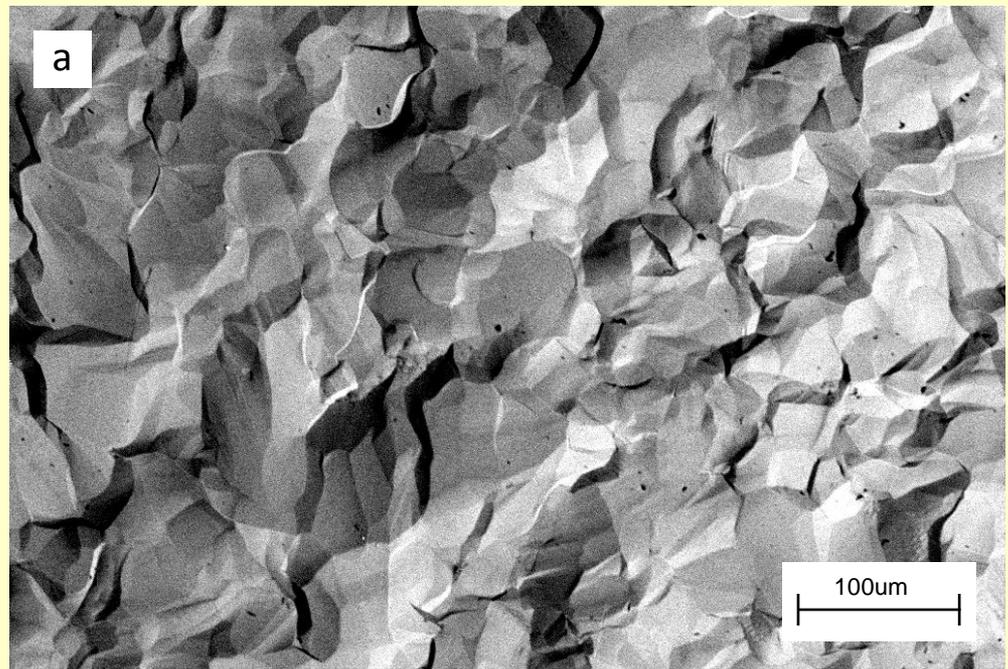
Current Density vs. Anode Potential



EP off (above) and
on the plateau for
0.5 M acid

Back-scattered
electron image

Scan length
dependence of
roughness



Conclusions

Nb EP is much like Ta and Ti

Mass transfer limitation and film formation
are attained

Surface topography comparable to standard EP

Process could be implemented in vertical EP

More work to be done !!